

ADVANCING THE SCIENTIFIC FRONTIER

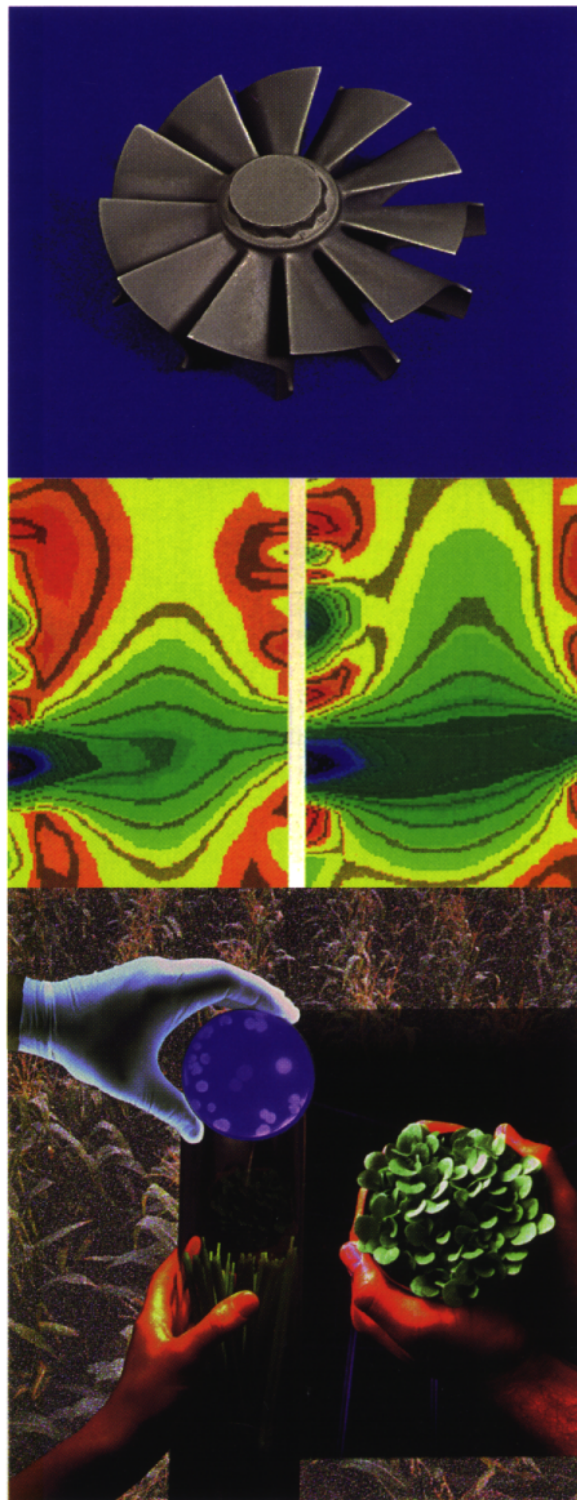
Advanced Alloys and Ceramics. Materials are critical for the technological future of the Nation. Basic research is essential for controlling materials performance and creating new materials. BES excels in synthesis and processing research, micro-characterization, and the multidisciplinary R&D required for the development of high-performance alloys, ceramics, and novel materials for a wide variety of energy-related applications.

Polymers. Widely used in transportation technologies, corrosive environments, and microelectronics, polymers are macromolecules made up of sequences of thousands of atoms. BES combines synthesis and processing; research with theory and microcharacterization to develop novel polymeric molecules and processing methods and to elucidate structure-property relationships.

Geosciences. The identification and recovery of energy resources and the geological disposal of radioactive and toxic wastes have enormous economic and social impacts. BES emphasizes theoretical, experimental, and field-based investigations on rock-fluid mechanics and subsurface migration. This research lies at the heart of a wide range of issues including subsurface contaminant transport, nuclear waste isolation, petroleum production, and geothermal resource development.

Energy Biosciences. Plants and photosynthetic micro-organisms are solar energy transducers that produce fuels and useful chemicals. BES supports fundamental research into the mechanisms of how plants and micro-organisms grow, metabolize, and reproduce. This research provides the foundation for the use of biological systems in energy-related technologies ranging from the production of biodegradable plastics to the conversion of biomass to potential fuels.

Heavy Element Chemistry. Heavy element chemistry provides fundamental understanding on the behavior of elements heavier than uranium in the environment. This research merges chemistry and physics, advanced spectroscopic techniques, and unique BES facilities to address related scientific issues in plutonium processing, nuclear waste isolation, nuclear weapons safety, remediation of contaminated sites, and the transport of plutonium in the environment.



Clockwise from upper left: high-performance intermetallic alloys, positron annihilation studies of surfaces, laser spectroscopy for trace element analysis, plasma processing, omnidirectional robotics platform, energy bioscience plant research, subsurface migration of fluids.